REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

It is believed that a certified copy of the priority document was filed in the parent application Serial No. 09/817,148. It is respectfully submitted that the present application is entitled to its foreign priority date under 35 USC §119.

A new Abstract is provided in response to the objection to the Abstract.

Minor formal changes are made to the specification.

Claims 1, 2 and 5-8 are present in this application. Claims 1, 5, 7 and 8 are amended and claims 3, 4 and 9 are cancelled by way of the present amendment.

Claims 1-8 stand rejected under 35 U.S.C. §102(b) over "Incremental algorithms for collision detection between solid models" by Ponamgi et al. (Ponamgi). Claim 9 stands rejected under 35 U.S.C. §101, and under 35 U.S.C. §103(a) over Ponamgi, in view of the article "I-COLLIDE: An interactive and Exact Collision Detection System for Large Scale Environments" by Cohen et al. in 1995.

The claimed invention is directed to a method and apparatus using shape data obtained by the approximation of analytic surfaces from polygons in kinematics simulation. None of the references cited in the outstanding Office Action discloses or suggests such a method or apparatus.

Ponamgi concerns an interference detection (interference check) and does not describe any kinematics simulation, or a kinematics simulation unit configured to perform a kinematics simulation. The position and orientation of a three-dimensional shape in a three-dimensional space are obtained as a result of performing a kinematics simulation. An interference check is not a kinematics simulation. The kinematics simulation according to claim 1 computes how components of a mechanism (as a non-limiting example, links, etc.) move while satisfying the constraint relationships which are mechanically present in the

shapes of revolute joint, slide joint, slip among planes, etc. Performing a kinematics simulation as recited in claim 1 corresponds to the process of obtaining the position and orientation of components (as a non-limiting example, links, etc.) as of an individual mechanism. The assembly model according to the present invention expresses such constraint conditions, which are to be satisfied, as geometric constraints and defines those geometric constraints with reference to the analytic surfaces extracted from polygons. The method of claim 1 is not suggested by Ponamgi.

The Office Action refers to FIG. 8 Ponamgi, which shows where a circular hole is provided in a disk with their centers being consistent with each other. FIG. 8 is an example of a face having two boundaries. In such a case, Ponamgi describes that in order to express the shape of one component, a shape expression of a nested structure is employed in the positional relationship where the center axes coincide. However, such a description is nothing but a technique to structuralize and express one component shape so that the interference check can be efficiently performed. The technique is not directed to handle any relationship between different components (for example, links). Further, no constraint relationship to be satisfied by the expression of the geometric constraints is defined.

The Office Action also states that page 21 of Ponamgi provides similar descriptions as in the present application. In Ponamgi, the shape of a thread is approximated to a polygon and an interference check is performed based thereon. On the other hand, the present invention is directed to the computation in which the shape data in polygonal expression is handled as an input and the shape data including analytic surfaces is handled as an output. Therefore, the method of claim 1 is clearly not suggested by Ponamgi.

The apparatus of claim 5 includes a kinematics simulation unit configured to perform a kinematics simulation by computing positions of the components according to the

positional relationship. As discussed above, Ponamgi does not suggest performing a kinematics simulation and thus also does not suggest the apparatus of claim 5.

As for Cohen, it is also directed to the technique concerning an interference check. Thus, neither Ponamgi nor Cohen is relevant to the method and apparatus of claim 1 where a kinematics simulation is performed.

It is respectfully submitted that the present application is in condition for allowance, and a favorable decision to that effect is respectfully requested.

Respectfully submitted,

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